US009636183B2

(12) **United States Patent**
Helm et al.

(10) **Patent No.:** **US 9,636,183 B2**
(45) **Date of Patent:** **May 2, 2017**

(54) **SELECTED IMAGE ACQUISITION TECHNIQUE TO OPTIMIZE PATIENT MODEL CONSTRUCTION**

(71) Applicant: **Medtronic Navigation, Inc.**, Louisville, CO (US)

(72) Inventors: **Patrick A. Helm**, Milton, MA (US); **Shuanghe Shi**, Southborough, MA (US)

(73) Assignee: **Medtronic Navigation, Inc.**, Louisville, CO (US)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 107 days.

(21) Appl. No.: **14/319,181**

(22) Filed: **Jun. 30, 2014**

(65) **Prior Publication Data**

US 2014/0313193 A1     Oct. 23, 2014

**Related U.S. Application Data**

(63) Continuation of application No. 12/908,195, filed on Oct. 20, 2010, now Pat. No. 8,768,029.

(51) **Int. Cl.**
*G06K 9/00*          (2006.01)
*G06K 9/32*          (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC .............. *A61B 34/20* (2016.02); *A61B 5/055* (2013.01); *A61B 6/032* (2013.01); *A61B 6/4441* (2013.01); *A61B 6/4476* (2013.01); *A61B 6/461* (2013.01); *A61B 6/467* (2013.01); *A61B 6/487* (2013.01); *A61B 6/52* (2013.01); *A61B 6/5235* (2013.01); *A61B 34/10* (2016.02); *G06T 11/005* (2013.01);
(Continued)

(58) **Field of Classification Search**
USPC ................................... 382/131, 294; 378/20
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | |
|---|---|---|---|
| 5,448,607 A | 9/1995 | McKenna | |
| 5,689,629 A | 11/1997 | Lee | |
(Continued)

FOREIGN PATENT DOCUMENTS

| | | | |
|---|---|---|---|
| CN | 1143898 A | 2/1997 | |
| CN | 1923138 A | 3/2007 | |
(Continued)

OTHER PUBLICATIONS

Chinese Office Action mailed Oct. 30, 2014 for China Patent Application No. 201180061196.X.
(Continued)

*Primary Examiner* — Kathleen Y Dulaney
(74) *Attorney, Agent, or Firm* — Harness, Dickey

(57)          **ABSTRACT**

A system and a method are disclosed that allow for generation of a model or reconstruction of a model of a subject based upon acquired image data. The image data can be acquired in a substantially mobile system that can be moved relative to a subject to allow for image acquisition from a plurality of orientations relative to the subject. The plurality of orientations can include a first and final orientation and a predetermined path along which an image data collector or detector can move to acquire an appropriate image data set to allow for the model of construction.

**16 Claims, 9 Drawing Sheets**